REMARKS

Claims 1-8, 10-15 and 35-41 are pending in the present application, with claims 9, 16 and 18-34 cancelled. Claims 1-8, 10-15 and 17 are rejected. Claim 35-41 are new and are patentable over the art of record. Claim 1 is amended to remove unnecessary limitations.

Prior to discussing the rejections, Applicants observe that on page 4 of the office action, in the last line, the rejections says that the broad recitation of claim 1 does not require the recombination centers to be located only in the N- and P- doped layers. That is true but it is incomplete. Claim 1 requires the recombination centers be disposed substantially in those layers.

The following remarks will show that the references of record do not show or suggest a P+ P- N- N+ structure with recombination centers in the P- and N- regions and that the evidence of a dramatic increase in UIS performance more than tips the scale in favor of patentability.

The rejection of claim 1 based on the Schlangenotto '428 and '858 is not supported by the references. Neither shows or suggests the recombination centers in P- and N- regions. The references are less specific than the Lutz reference that Applicants disclosed as prior art in the Background. When Schlangenotto '428 and '858 are read together with the teachings of Lutz, the only specified location for recombination centers is in the N- and N+ regions. Thus, taken as a whole, the prior art teaches away from the invention. Tokura fails to show an N+ surface regions spaced from a P+ surface region.

The dramatic improvement is the ability of the invention to withstand large surges of energy is not shown or suggested in any reference. There is no motivation in any reference to improve UIS capability by the providing the claimed P+ P- N- N+ structure with recombination centers in the P- and N- regions.

In summary, the rejection fails to state a prima facie case of obviousness. Objective evidence of patentability based upon the dramatic results obtained with the claimed P+ P- N- N+ structure with recombination centers in the P- and N-

regions clearly outweighs the vague suggestion of Schlangenotto '428 and '858 to put recombination centers in unspecified locations.

Entitlement of Applicants and burden of examination

Applicants are entitled to a patent unless the evidence of the prior art shows or suggests the invention. This is the essential thrust of 35 USC § 102 and 103. This rejection is based only on 35 USC § 103 so the examiner has the further burden of identifying the differences between the claimed invention and the art, evaluating what the references show or suggest and considering evidence presented by the applicant. Such evidence may include test data provided in the specification.

Schlangenotto '428 and '858 do not show recombination centers in P- and N- regions

Applicants believe they are the first to show or suggest placing recombination centers in both the P- and N- region of a P+ P- N- N+ structure. The prior art does not show or suggest such a structure with the claimed location of recombination centers.

The rejection observes that neither Schlangenotto reference limits the location of the recombination centers to specific areas of the power diode and concludes that one skilled in the art would form recombination centers throughout the device. See Office Action of 3/11/2005 at page 4.

That observation may be correct, but the conclusion is wrong. The rejection erroneously used a broad disclosure of recombination centers at unspecified locations to support a rejection of claims that specify the locations as in the P- and N- regions. The rejection, at best, uses a genus to reject a species and that is improper.

Assume for the sake of argument that Schlangenotto '428 and '858 disclose recombination centers in diodes. It is well settled law that a disclosure of a genus does not necessarily disclose all species or preclude patentability of one or more species. The applicants are not claiming the genus. Instead claim 1 is for a species: recombination centers comprising noble metal impurities disposed substantially in said N- doped layer and P- doped well. No reference or combination of references shows or suggests putting substantially all the recombination centers in the adjoining lightly doped regions of the device.

Minimal recombination centers
in surface N+ not shown by prior art

The rejection also fails to account for the implicit feature of the claims that reduces or eliminates recombination centers in the N+ region. Claim 1 calls for substantially all of the recombination centers to reside in the P- and N- regions. While that limitation does not preclude some recombination centers in the N+ region, it clearly provides a structure with minimal to no recombination centers in the N+ region. This reduction of recombination centers in the N+ region is contrary to Schlangenotto '428 and '858 that, as the rejection observes, place no limit on either location or the relative amount of recombination centers in the N+ layer.

Proper examination requires considering
Lutz US 5,747,872 with Schlangenotto patents

The rejection fails to properly consider the evidence of patentability based upon other differences between the prior art and the invention. For example, the Background of the application discloses Lutz patent U.S. 5,747,872. It teaches that locating recombination centers in the N- and N+ regions is crucial. The rejection fails to consider the dual inferences of Lutz: no or minimal recombination centers in the P- layer and presence of recombination centers in the N+ layer.

The rejection fails to take into account the combined teachings of Lutz and Schlangenotto '428 and '858. The latter specify no location and Lutz teaches it is crucial to locate the recombination centers only in the N type regions. By ignoring Lutz, the rejection fails to consider this further difference of the invention: by putting most of the recombination centers in the N- and P- regions, there are minimal recombination centers in the N+ region.

In summary, the evidence from the prior art shows no specific location (Schlangenotto '428 and '858) or that location in the N+ layer is crucial (Lutz). Given that evidence, it would be erroneous to find any suggestion to put recombination centers substantially in the P- and N- regions and not in the N+

region. Such a finding resembles the long-discredited "obvious to try" rejection and should be withdrawn.

Tokura does not show a N+ region laterally spaced from a P+ region

In order to establish a *prima facie* case of obviousness the prior art references must teach or suggest all the claim limitations. *In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)(Emphasis Added)*. Claim 1 recites in part,

> "a P- doped well formed in the N- doped layer and extending . . . into the N- doped layer, a P+ doped region formed in the P- doped well and extending . . . into the P-doped well . . . an N+ doped region formed . . . in the N- doped layer, said N+ region laterally spaced from the P+ doped region . . .l". (*Emphasis Added*).

Tokura fails to teach or suggest such limitations and cannot support a *prima facie* case of obviousness. In Tokura the N+ region relied upon for the rejection is identified by reference numeral 7. Each N+ region 7 encircles and abuts P+ region 10. The N+ regions 7 are not "spaced" from the P+ regions 10 as required by the claim. Thus, the structure of Tokura fails to meet the limitation of claim 1 that the N+ region is spaced from the P+ region.

Evidence of unobviousness based on superior results

The specification contains evidence that demonstrates the invention is not obvious and is patentable over the art of record. Samples of the claimed invention demonstrate a dramatic improvement over prior art control structures in their respective handling unclamped inductive switching (UIS). That is a measure of how much energy a device may handle during avalanche before it is destroyed. When devices made in accordance with the prior art were tested with devices made in accordance with the invention the invention Samples 1 and 2 had a UIS capability fifteen times greater than Controls1 and 2; Sample 3 had a UIS capability of 70 mj where Control 3 has virtually no UIS capability. See Table 1 on page 5 of the application. No prior art suggests that putting

recombination centers into the two lightly and oppositely doped P-N- regions of a P+P-N-N+ structure will have such an extraordinary improvement in UIS capability.

New Claims 35-41 Are Patentable

New claim 35 defines the P+P-N-N+ structure in terms of the thickness of the P+ layer with respect to the P-well and the N+ region and the presence of recombination centers in the N- doped layer and the P-doped well. Such a structure is not shown or suggested in the references. In Tokura the P+ region 7 at the surface has the same thickness at the N+ region 10. The patentable feature of placing recombination centers in the lightly and oppositely doped regions is discussed in detail above.

Claim 36 further defines the P+ region as having a (second) boundary shallower than the boundaries of the P- and the surface N+ region. This boundary relationship is not shown or suggested in the Tokura.

Claim 37 is based on the specification that discloses a range of ratios for the thicknesses of the P+ and P- regions. The range of ratios is based on the specific thicknesses disclosed in the specification and also set forth in claim 38.

Claims 40 and 41 claim the invention as shown in examples found in Fig. 2 and Fig. 4, respectively. Tokura does not show an N+ surface region spaced from a surface P- region.

Reconsideration of the application, including consideration of all the Lutz prior art and the dramatic results found in Table 1 are requested. Applicants believe the evidence and the above remarks demonstrate the invention as claimed is patentable over the art of record.

Respectfully submitted,

7/11/2005
Date

Thomas R. FitzGerald
Registration No. 26,730

E-mail: Tom.FitzGerald@FitzPatent.com

Thomas R. FitzGerald, Esq.
Law Office of Thomas R. FitzGerald
16 East Main Street, Suite 210
Rochester, New York 14614-1803
Telephone : (585) 454-2250
Fax : (585) 454-6364